At one small (0.22 ha) aspen stand in which both sapsuckers nested in 1973 (fig. 1), encounters and competition were reduced by the utilization of different foraging areas. The pair of *thyroideus* fed to the north along a dry hillside of ponderosa pines, while the *nuchalis* pair fed to the south along a dense riparian grove of deciduous trees, brush, and scattered conifers. It therefore appears that nest sites were chosen for their proximity to suitable foraging habitat rather than on the characteristics of the aspen nest stand itself. Isolating mechanisms were sufficiently well developed to allow *thyroideus* and *nuchalis* to share aspen stands on occasion. These isolating mechanisms probably were chiefly behavioral but may have also been temporal, since in Rocky Mountain National Park *thyroideus* arrived and bred an average of two weeks ahead of *nuchalis*. Temporal differences were less marked in the two other study areas.

SUMMARY

Two congeneric woodpeckers, the Williamson and Red-naped Sapsuckers, are sympatric in much of the Rocky Mountains. We collected nest tree data for a total of 57 *thyroideus* and 46 *nuchalis* nests at three locations in Colorado and Wyoming. Our findings show that in these three areas, at least, there were no significant differences between the two species in nest site preference. Both favored healthy or, more frequently, *Fomes*-infected aspen about 23 cm in diameter, and tended to excavate nests low (2–3 m) above the ground. Both also showed a preference for nests with their entrances facing southward, possibly to help keep the nest warm during the cool spring and early summer months. Nest stands used by *thyroideus* were invariably near an open forest of ponderosa pine, which the birds used for sap and insect foraging; *nuchalis* used a wide variety of habitats for nesting and feeding. Because the two sapsucker species often nested in close proximity, it appears that species isolation was not dependent on spatial (habitat) separation in our study areas.

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POST-FLEDGING PARENTAL CARE IN CRESTED AND SOOTY TERNS

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Ashmole and Tovar (1968) described the feeding of 5 to 7 month old Royal Terns (*Thalasseus maximus*) by their presumed parents. They also cited evidence of prolonged parental care in Elegant and Sandwich terns (*Thalasseus elegans* and *Sterna sandvicensis*) and attributed this to the time needed by juveniles to learn specialized feeding techniques. Dunn (1972) showed that, in their winter quarters, first winter Sandwich Terns were less efficient at feeding than older birds, but he did not record adults feeding their young.

The following observations were made between May and October 1973 on Bird Island, Seychelles, and are pertinent to the phenomenon of protracted parental care in terns.

OBSERVATIONS

Thalasseus bergii. Crested Terns are not known to breed in the Seychelles but are present throughout the year. On Bird Island 10 to 30 were always

present. They were mainly adults, a maximum of 5 juveniles being seen together. On my arrival in May, 2 juveniles were present, and were being fed by their presumed parents who were already in non-breeding plumage and in wing molt. These juveniles were fed by adults until 16 August after which they frequently begged from the adults but were not seen to be fed by them.

During May to August, the juveniles accompanied adults on fishing excursions over shallow water inside the reef, but they always returned to shore to be fed. The juveniles did not plunge dive but often "contact-dipped" (Ashmole & Ashmole 1967) to pick up pieces of weed, sometimes repeatedly dropping and retrieving it. After August they spent more time on their own, but I did not see them catch prey nor did I see their parents feed them.

These birds were not marked, but from plumage differences the same juveniles were present throughout the period. When an adult arrived carrying fish and calling loudly, only one of the juveniles begged. The adult then settled next to this bird, suggesting that it was its parent. Interactions between the same identifiable parents and young were further suggested by the arrival, on 11 September, of a dark-backed adult Crested Tern (subsp.?). When this distinctive bird flew over calling and carrying fish no juveniles begged.

The age of these juveniles was not known since little is known about the breeding of this species in western Indian Ocean. Eggs were found in November at African Banks in the Amirantes approximately 250 km away (Vesey-Fitzgerald 1941), and in July on Aldabra over 1000 km away (Diamond 1971, who thought breeding may also occur there in January). There seems no doubt that juvenile Crested Terns were fed by their parents for a least 4 months (the time they were seen being fed on Bird Island) after leaving their natal colony, and possibly for much longer.

Sterna fuscata. On Bird Island, Sooty Terns laid eggs in early June and the chicks hatched in early July. From 1972 and 1973 data on 400 chicks they could fly at 8 to 10 weeks of age but averaged a further 17 days in the colony before leaving. Throughout this period the chicks were entirely dependent on their parents for food. After a chick left it was never seen in the colony again.

In September and October juveniles frequently flew in company with one or two adults (presumably their parents), both adults and young calling incessantly. These calls continued throughout the night, as Ashmole (1963) found on Ascension Island.

At this time, juveniles also flew alone over both the colony and the sea. Over the sea three kinds of activity, apart from flying or soaring, were seen: (i) gliding low over the water and dipping the bill, i.e. presumably drinking as adults do (pers. observ.); (ii) making erratic darting movements low over the water (similar to those of juvenile Inca Terns *Larosterna inca*, described by Ashmole & Tovar (1968)); and (iii) dipping to the surface and picking up weed.

On three occasions I saw juveniles attempting to drink fly into waves; twice they managed to take off again, but the other time the waterlogged bird either swam or drifted ashore. Juveniles were frequently observed in the sea, presumably as a result of hitting waves while drinking. Thus maneuvers associated with drinking must require some learning, or at least the ability to avoid waves must be acquired.

Feeding must require even more skill. Dorward (1962) recorded Sooty Terns "surface plunging" off Ascension Island, but in the Seychelles their feeding behavior was similar to that described by Watson (1908). The adults, in large flocks over shoals of large fish, darted in erratic flight low over the water without touching it. The distance from which I was able to watch these flocks was too great to determine whether the birds captured prey, but it seems likely that they were chasing small fish or squid as these jumped out of the water. The darting movements of juveniles close to the colony were strikingly similar to those of the feeding adults, and probably constituted the early stages of learning these maneuvers. Despite observation at close range, however, I never saw a juvenile catch prey, and they were probably still dependent on their parents for food.

My attempts to confirm that juveniles depended upon their parents after they left the colony were not successful because I encountered no feeding flocks during 2 boat trips in waters adjacent to the island. Within 5 km of Bird Island the boat was continually followed by parties of juveniles, while all adults were birds returning to the colony, and they paid no attention to the boat. Beyond 5 km, all birds were adults returning to the colony, with two exceptions. On 20 September I saw a juvenile with two adults flying towards the island about 8 km away, and on 22 October I saw a juvenile with two adults about 20 km away from the island.

Although these two observations suggest that juveniles do fly to sea with their parents, adults were not seen feeding juveniles at sea. However, I saw aerial feeding over the colony. The adult bird flew above the juvenile while the latter gave the begging call. The adult then regurgitated food and passed it directly to the juvenile's bill beneath. In this way young birds could be fed at sea by their parents without having to settle on the water or return to land. This would be essential during the supposed period of juvenile dependence on the parents for food after leaving the colony.

DISCUSSION

The long period of post-fledging care shown above for Crested Terns follows the pattern for other *Thalasseus* terns reported by Ashmole and Tovar (1968), who together with Dunn (1972) considered "playing" with inedible objects to be the early stages of learning specialized feeding methods. These characteristics were also shown by juvenile Sooty Terns, but in this species the period of parental care is probably not so prolonged as in the "crested" terns. Robertson (1969) found that the ranges of adult and juvenile Sooty Terns diverged about 2 months after they left the colony. The juveniles then undertook a trans-Atlantic migration while the adults remained much closer to the colony. If a similar situation prevails among Sooty Terns of the western Indian Ocean, juveniles can be dependent on their parents for a maximum of 4 to 5 months, of which only 2 are spent at sea where they can learn to hunt for themselves. The persistence with which juveniles "played" with pieces of weed by "contact dipping" prompts the question whether they feed in the same way as adults, or whether they catch their prey at the surface by contact dipping during the early stages of their independence. At present there is no evidence to support the latter suggestion. Observations on the food and feeding behavior of juvenile Sooty Terns, once they have become independent of their parents, would obviously be invaluable.

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